

ABSTRACT

A closed loop vapor cycle generated by a special device formed by heat transfer and a vapor expander means it is utilized to convert waste heat from conventional power systems into additional thermodynamic work, thereby improving the overall power system efficiency. Superheated vapor (i.e. steam) is instantaneously produced inside special energy transfer means where waste heat is converted into fluid energy with desired thermodynamic properties. The superheated vapor is then converted into mechanical energy through special work-producing units (expanders), thereby returning a significant fraction of the energy contained in the waste heat to the power system.

When the power system under consideration is an internal combustion engine the energy contained in the exhaust gases (waste heat) is transferred back to the engine through one or more expanders directly or indirectly coupled with the engine load. The energy extracted from the waste heat can also be added back to the engine by means able to enhance the availability of oxygen (oxygenators) during the combustion. In this case, the engine also improves its dynamic response and reduces its production of toxic emissions. If the engine utilizes heavy fuels (i.e. diesel engines), this device completely eliminates the formation of the highly toxic particulate (black smoke), while significantly improving engine performance. The cost of the energy required to operate the device proposed in this invention is zero since it only recuperates and utilizes energy in the form of heat that is normally discharged into the environment.